

What is Claimed is:

1. A method for forming a contact hole of a semiconductor device, comprising the steps of:

5 (a) sequentially forming a capping layer and a planarized interlayer insulating film on a semiconductor substrate having a predetermined lower structure;

(b) selectively etching the interlayer insulating film to expose a predetermined region of the capping layer;

10 (c) removing the exposed capping layer;

(d) subjecting the resulting structure to a plasma treatment using a mixture gas containing oxygen; and

(e) performing a cleaning process.

15 2. The method according to claim 1, wherein the plasma treatment is performed using a plasma of $\text{NF}_3/\text{O}_2/\text{He}$ mixture gas, plasma of Ar/O_2 mixture gas, plasma of CF_4/O_2 mixture gas or plasma of $\text{CF}_4/\text{O}_2/\text{Ar}$ mixture gas.

20 3. The method according to claim 1, wherein the step (b), (c) and (d) are performed in a same chamber without intermittence.

4. The method according to claim 1, wherein the

step (d) is performed in an ex-situ process in a separate plasma chamber.